

CLAIMS

What is claimed is:

1. A method for accessing ferroelectric memory cells in a ferroelectric memory device, the method comprising:
 - 5 performing a read, restore, or write operation to access one or more ferroelectric memory cells along a selected wordline in a ferroelectric memory array; and
 - activating a non-selected wordline while a bitline and a plateline associated with the ferroelectric memory cells along the non-selected wordline
 - 10 are both substantially at a first voltage.
2. The method of claim 1, wherein the first voltage is ground.
3. The method of claim 1, further comprising activating other
 - 15 wordlines in a first plate group that includes cells along the selected wordline while bitlines and platelines associated with the first plate group are substantially at the first voltage to discharge storage nodes of cells of the first plate group.
4. The method of claim 3, wherein the wordlines in the first plate
 - 20 group are activated while the bitlines and platelines associated with the first plate group are substantially at the first voltage each time memory cells in the first plate group are accessed.
5. The method of claim 3, wherein the wordlines in the first plate
 - 25 group are activated while the bitlines and platelines associated with the first plate group are substantially at the first voltage every N^{th} time memory cells in the first plate group are accessed, N being an integer greater than 1.
6. The method of claim 3, wherein a first subset of wordlines in the
 - 30 first plate group are selectively activated while the bitlines and platelines associated with the first plate group are substantially at the first voltage each time

memory cells in the first plate group are accessed, wherein the first subset of wordlines in the first plate group is chosen for selective activation according to a plate group access counter associated with the first plate group.

5 7. The method of claim 6, wherein the first subset is half of the wordlines in the first plate group and a second subset is the remaining half of the wordlines in the first plate group, wherein one of the first and second subsets of the wordlines in the first plate group are selectively activated while the bitlines and platelines associated with the first plate group are substantially at the first
10 voltage every time memory cells in the first plate group are accessed, wherein the subset to be activated is alternated every other time memory cells in the first plate group are accessed.

 8. The method of claim 3, further comprising activating wordlines in a
15 second plate group that does not include the selected wordline while bitlines and platelines associated with the second plate group are substantially at the first voltage.

 9. The method of claim 8, wherein the second plate group is one of a
20 plurality of non-selected plate groups that do not include the selected wordline, and wherein the second plate group is chosen for selective activation according to a non-accessed plate group counter or shift register.

 10. The method of claim 8, wherein the first voltage is ground.
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 11. The method of claim 3, wherein the first voltage is ground.

 12. The method of claim 1, further comprising activating wordlines in a plate group that does not include the selected wordline while bitlines and
30 platelines associated with the second plate group are substantially at the first voltage.

13. The method of claim 12, wherein the plate group is one of a plurality of non-selected plate groups that do not include the selected wordline, and wherein the plate group is chosen for selective activation according to a non-
5 accessed plate group counter or shift register.

14. The method of claim 12, wherein the first voltage is ground.

15. The method of claim 1, wherein the non-selected wordline is
10 activated before, during, or after the read, restore, or write operation while the bitline and plateline associated with the ferroelectric memory cells along the non-selected wordline are both substantially at a first voltage.

16. The method of claim 1, further comprising activating one or more
15 wordlines on power-up while corresponding bitlines and platelines are substantially at the first voltage.

17. The method of claim 1, further comprising activating one or more
20 wordlines before power-down while corresponding bitlines and platelines are substantially at the first voltage.

18. A method for accessing ferroelectric memory cells in a ferroelectric memory device, the method comprising:

performing a read, restore, or write operation to access one or more
25 ferroelectric memory cells along a selected wordline in a ferroelectric memory array; and

activating at least one non-selected wordline in the array while one or more bitlines and platelines associated with the cells along the non-selected wordlines are substantially at a first voltage.

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19. The method of claim 18, further comprising activating the selected wordline while a bitline and a plateline associated with cells along the selected wordline are substantially at the first voltage.

5 20. The method of claim 18, wherein the at least one non-selected wordline includes non-selected wordlines in a first plate group that includes cells along the selected wordline.

10 21. A method for accessing ferroelectric memory cells in a ferroelectric memory device, the method comprising:
 performing a read, restore, or write operation to access one or more ferroelectric memory cells along a selected wordline in a ferroelectric memory array; and
 activating one or more wordlines in the array while one or more bitlines
15 and platelines associated with the cells along the one or more wordlines are substantially at a first voltage, wherein the one or more wordlines includes at least one non-selected wordline in a plate group that does not include cells along the selected wordline.

20 22. A ferroelectric memory device, comprising:
 an array of ferroelectric memory cells arranged in rows and columns, the cells individually comprising at least one ferroelectric cell capacitor having a first terminal and a second terminal coupled with a plateline, and at least one cell transistor adapted to selectively couple the first cell capacitor terminal to an array
25 bitline associated with an array column according to an array wordline, wherein rows of the memory cells are coupled with a corresponding wordline and a plateline, wherein the array comprises a plurality of plate groups, and wherein cells along a plurality of wordlines in a plate group are coupled with a common plateline;
30 a control system coupled with the array, the control system providing wordline and plateline signals to the array during read, restore, and write

operations to access one or more ferroelectric memory cells along a selected wordline in the array; and

5 a wordline pulse system coupled with the control system and with the array, the wordline pulse system being adapted to activate one or more non-selected wordlines in the array while one or more bitlines and platelines associated with ferroelectric memory cells along the one or more non-selected wordlines are both substantially at a first voltage.

10 23. The device of claim 22, wherein the first voltage is ground.

24. The device of claim 22, wherein the wordline pulse system is adapted to activate non-selected wordlines in a first plate group that includes cells along the selected wordline before, during, or after the read, restore, or write operation while bitlines and platelines associated with the ferroelectric
15 memory cells along wordlines in the first plate group are substantially at a first voltage.

25. The device of claim 22, wherein the wordline pulse system is adapted to activate wordlines in a second plate group that does not include cells along the selected wordline before, during, or after the read, restore, or write
20 operation while bitlines and platelines associated with the ferroelectric memory cells along wordlines in the second plate group are substantially at the first voltage.

25 26. The device of claim 22, wherein the wordline pulse system is further adapted to activate the selected wordline while a bitline and a plateline associated with memory cells along the selected wordline are substantially at the first voltage.

30 27. The device of claim 22, wherein the wordline pulse system is further adapted to activate wordlines in a first plate group that includes cells

along the selected wordline while bitlines and platelines associated with the ferroelectric memory cells along wordlines in the first plate group are substantially at the first voltage.

5 28. The device of claim 27, wherein the wordline pulse system activates wordlines in the first plate group while the bitlines and platelines associated with the first plate group are substantially at the first voltage each time memory cells in the first plate group are accessed.

10 29. The device of claim 27, wherein the wordline pulse system activates wordlines in the first plate group while the bitlines and platelines associated with the first plate group are substantially at the first voltage every N^{th} time memory cells in the first plate group are accessed, N being an integer greater than 1.

15 30. The device of claim 27, wherein the wordline pulse system comprises a plurality of plate group access counters, the plate group access counters being individually associated with plate groups of the array and indicating a number of accesses of cells in the associated plate group, wherein
20 the wordline pulse system selectively activates a first subset of wordlines in the first plate group while the bitlines and platelines associated with the first plate group are substantially at the first voltage each time memory cells in the first plate group are accessed, and wherein the first subset of the wordlines in the first plate group is chosen for selective activation according to a plate group access
25 counter associated with the first plate group.

 31. The device of claim 30, wherein the first subset is half of the wordlines in the first plate group and a second subset is the remaining half of the wordlines in the first plate group, wherein the wordline pulse system selectively
30 activates one of the first and second subsets of the wordlines in the first plate group while the bitlines and platelines associated with the first plate group are

substantially at the first voltage every time memory cells in the first plate group are accessed, and wherein the subset to be activated is alternated every other time memory cells in the first plate group are accessed.

5 32. The device of claim 27, wherein the wordline pulse system is further adapted to activate wordlines in a second plate group that does not include cells along the selected wordline while bitlines and platelines associated with the ferroelectric memory cells along wordlines in the second plate group are substantially at the first voltage.

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 33. The device of claim 32, wherein the wordline pulse system comprises a non-accessed plate group counter or shift register indicating a particular plate group of the array, wherein the second plate group is one of a plurality of non-selected plate groups that do not include the selected wordline,
15 and wherein the second plate group is chosen for selective activation according to the non-accessed plate group counter or shift register.

 34. The device of claim 22, wherein the wordline pulse system comprises a plurality of plate group access counters, the plate group access
20 counters being individually associated with plate groups of the array and indicating a number of accesses of cells in the associated plate group, wherein the wordline pulse system selectively activates a first subset of wordlines in a first plate group that includes cells along the selected wordline while the bitlines and platelines associated with the first plate group are substantially at the first voltage
25 each time memory cells in the first plate group are accessed, and wherein the first subset of the wordlines in the first plate group is chosen for selective activation according to a plate group access counter associated with the first plate group.

30 35. The device of claim 22, wherein the wordline pulse system comprises a logic circuit and a plurality of wordline pulse drivers individually

associated with wordlines in the array, the wordline pulse drivers individually comprising two NMOS transistors coupled in series between the logic circuit and the corresponding wordline for selectively activating the corresponding wordline.

5 36. The device of claim 22, wherein the wordline pulse system comprises a logic circuit and a plurality of wordline pulse drivers individually associated with wordlines in the array, the wordline pulse drivers individually comprising an NMOS transistor coupled in series between the logic circuit and the corresponding wordline for selectively activating the corresponding wordline.

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 37. A ferroelectric memory device, comprising:
 an array of ferroelectric memory cells arranged in rows and columns;
 a control system coupled with the array, the control system providing wordline and plateline signals to the array during read, restore, and write
15 operations to access one or more ferroelectric memory cells along a selected wordline in the array; and
 a wordline pulse system to provide a pulse to one or more non-selected wordlines in the array while one or more bitlines and platelines associated with ferroelectric memory cells along the one or more non-selected wordlines are both
20 substantially at a first voltage.

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 38. The device of claim 37, wherein the wordline pulse system provides the pulse to the one or more non-selected wordlines in the array before or after a read, restore, or write operation to discharge storage nodes of cells along the
25 one or more wordlines.

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 39. The device of claim 37, wherein the first voltage is ground.

 40. The device of claim 37, wherein the wordline pulse system
30 comprises a logic circuit and a plurality of wordline pulse drivers individually associated with wordlines in the array, the wordline pulse drivers individually

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comprising an NMOS transistor coupled in series between the logic circuit and the corresponding wordline for selectively activating the corresponding wordline.